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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/580,767	LOCK ET AL.	
	Examiner	Art Unit	
	OMAR F. FERNANDEZ RIVAS	2129	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *05 December 2008*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *3-5,7-9,11-19,21-25,27-29,31-33 and 37-43* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *3-5,7-9,11-19,21-25,27-29,31-33 and 37-43* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

1. This Office Action is in response to an AMENDMENT filed by the Applicant entered on October 2, 2008.

2. The Office Action of May 21, 2008 is incorporated into this Final Office Action by reference.

Status of Claims

3. Claims 3-5, 7, 9, 11-13, 16-17, 21-23, 27-29, 31-33 and 35 have been amended. Claims 1-2, 6, 10, 20, 26, 30, 34 and 36 have been cancelled. Claims 40-43 have been added. Claims 3-5, 7-9, 11-19, 21-25, 27-29, 31-33, 25 and 37-43 are pending on this application.

Specification

4. The objection to the abstract is withdrawn.

Claim Objections

5. In light of the amendment made on claim 17, the objection is withdrawn.

Claim Rejections - 35 USC § 112

6. In light of the amendments made, the rejection of claims 1, 2, 9, 16, 25 and 35 is withdrawn.

7. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

8. Claims 3-5, 7-9, 11-19, 21-25, 27-29, 31-33, 25 and 37-43 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

There are two separate requirements set forth in this paragraph:

(A) the claims must set forth the subject matter that applicants regard as their invention; and

(B) the claims must particularly point out and distinctly define the metes and bounds of the subject matter that will be protected by the patent grant.

The first requirement is a subjective one because it is dependent on what the applicants for a patent regard as their invention. The second requirement is an objective one because it is not dependent on the views of applicant or any particular individual, but is evaluated in the context of whether the claim is definite — i.e., whether the scope of the claim is clear to a hypothetical person possessing the ordinary level of skill in the pertinent art.

Applicant must understand that claims are not just words listing out invention elements...they are limitations that define the fundamental claim scope. Although an essential purpose of the examination process is to determine whether or not the claims define an invention that is both novel and nonobvious over the prior art, another essential purpose of patent examination is to determine whether or not the claims are

precise, clear, correct, and unambiguous. The uncertainties of claim scope should be removed, as much as possible, during the examination process.

9. Claims 11, 27 and 37 recite: "...**a variable** in the **at least one** anomaly characterisation rule which is **defined as being in constant mode** and is numerical is at least partly evaluated by providing a range of values for the variable" In mathematics and the mathematical sciences, a constant is a fixed, but possibly unspecified, value. This is in contrast to a variable, which is not fixed (see www.wikipedia.com). It is unclear how a "variable" can be a "constant" and then change the value of the "constant" (a fixed value). The claims also recite "selecting at least one of the values having optimum accuracy". However, the claims do not specify what this "accuracy" is referring to or what it is measuring. A person of ordinary skill in the arts would not be able to determine the metes and bounds of this limitation in the claims without engaging in undue experimentation since "accuracy" could measure a number of parameters in a system.

10. Claim 12 recites the limitations "a first range with spacing between values" and "the second range of values having narrow spacing relative to that of the first range" The terms "spacing" and "narrow" in claim 12 are relative terms which render the claim indefinite. The terms "spacing" and "narrow" are not defined by the claim, the specification does not provide a standard for ascertaining the requisite degree, and one of ordinary skill in the art would not be reasonably apprised of the scope of the

invention. Without a restriction or definition as to what these terms entail and how they specifically limit the claim, a person of ordinary skill in the arts would not be able to determine the scope of the invention and therefore would not be able to replicate the invention without engaging in undue experimentation. Spacing could be decimals, multiples or any number. Narrow could vary from person to person, and therefore there is nothing specific as to what something narrow is.

11. Claim 40 recites a method performing steps a) to d). However, it seems as if a), b) and d) are not performed in the computer used for step c). Moreover, steps a), b) and d) seem to be able to be implemented without implementing step c). Moreover, if steps a) and b) are performed outside the computer in step c), how can it use the data in steps a) and b)? Moreover, step d) does not seem to be performed in the computer of step c) or receive any data from the computer, how can this alert be provided since the computer performs the anomaly detection? The metes and bounds of the claimed invention cannot be established since there is no clear interdependency of the different steps in the claim.

Step b) recites "defining a rule generalisation based on logic of at least First order" However, the claim has not described how this rule generalisation is defined. That is, what data is used in order to define it, what does this rule generalisation describe. Lacking this description, the intent of this limitation cannot be established, since it is not clear how this rule generalisation is defined or even how it actually relates to any of the other data in the claim (the training data, the relevant background

knowledge...). As claimed, any rule generalisation (whatever that is) could be defined, even if it is irrelevant to any of the other data in the claim. The metes and bounds of the claimed invention are not clearly defined and therefore cannot be established.

Step i) of step c) recites transforming the rule generalisation rule into a more specific rule generalization by…based on the training data set and relevant background knowledge. It is not clear how this specific rule can be obtained from the rule generalisation, the training data and the background knowledge since these do not seem to be related or depend from one another. As claimed, the rule generalisation is not limited to having or operating on the same type of data in the training data or in the relevant background knowledge. The intent of these limitations is not clearly defined by the claim language and therefore the metes and bounds of the claim cannot be established.

Step i) of step c) recites "relevant background knowledge consisting of at least one of concepts, facts of interest and functions for calculating values of interest" However, it is not clear what this relevant background knowledge is relevant to (is it relevant to the anomalies in the training data (both positive and negative), is it relevant to the rule generalization which is independent of the training data?) Moreover, how is this relevant background data obtained and identified?

Step iii) of step c) recites: "incorporating the more specific rule generalisation in the rule set if it classifies anomalies in the training data set adequately in terms of **covering at least some** of the positive anomaly examples" Step i) recites that the specific rule will be generated based on the training data, which incorporates positive

and negative examples. Therefore, it seems as if this condition will always be satisfied, since the specific rule created based on the training data will classify anomalies in the training data and will obviously **cover** the positive examples incorporated in the training data. The intent of this limitation in the claim is not clear.

Claims 3-9, 11-19 and 41 depend on claim 40 and incorporate the same deficiencies as set forth above and furthermore fail to correct the deficiencies.

Claim 42 recites limitations similar to that of claim 40 and is rejected on the same basis.

Claims 21-23, 25 and 27-29 further limit claim 42 but fail to cure the deficiencies set forth above and are rejected on the same basis.

Claim 43 recites limitations similar to that of claim 40 and is rejected on the same basis.

Claims 31-33, 35 and 37-39 further limit claim 43 but fail to cure the deficiencies set forth above and are rejected on the same basis.

12. Claim 41 recites: "after the step of evaluating the more specific rule generalisation, the computer apparatus is used to iterate the processing and evaluating steps for **one or more rules in the more specific rule generalisation** which do not classify anomalies in the training data set adequately". However, in claim 40, step i) of step c) there is only one specific rule generated. It is not clear if it is this one specific rule created that is further processed if it is determined in the evaluating step that it does not classifies anomalies adequately or if there are various specific rules created

(which is not suggested by the claims) and these are all evaluated and then the ones that do not classify the data adequately are further processed.

Response to Applicant's arguments

13. The Applicants arguments regarding the rejection of claims 11, 27 and 37 have been fully considered but are not persuasive.

In reference to Applicant's arguments:

The Examiner rejected claims 11, 27 and 37 for being unclear for using the expressions "variable" and "constant" to apparently refer to the same feature. In this regard the Oxford Dictionary of Computing, Oxford University Press, fourth edition, 1996, defines "variable" and "constant" as follows:

Variable: A unit of storage that can be modified during program execution, usually by assignment or read operations. A variable is generally denoted by an identifier or by a name.

Constant: A quantity or data item whose value doesn't change.

In claims 11, 27 and 37, the expressions "variable" and "constant" are used to indicate that, during the rule refinement process, a variable (with appropriate mode declaration) can become replaced by a constant value - i.e. the variable thereupon stops being a variable and becomes a constant. For numeric values the constant is chosen from a range of potential values.

Claims 11, 27 and 37 are amended above to clarify the claim language, i.e. "selecting a value having optimum accuracy": after "variable," these claims now continue "estimating a respective accuracy for each value and selecting for the variable one of the values which is optimum for accuracy in the range of values". It is believed that this amendment to claims 11, 27 and 37 overcomes the examiner's claim rejections.

Examiner's response:

Claims 11, 27 and 37 recite: "**a variable** in the at least one anomaly characterisation rule **which is defined as being in constant mode** and is numerical is at least partly **evaluated by providing a range of values for the variable**". If the variable is defined as being in **constant mode** (a quantity or data item whose value doesn't change, according to the definition provided by the Applicant), then it cannot be changed by providing a range of values, it is **constant**. There is a contradiction in the claim, is it a variable whose value can be changed or is it a constant, whose value cannot be changed?

As for the accuracy value, the claims do not specify what this "accuracy" is referring to or what it is measuring (the accuracy of the values as applied to what?). A person of ordinary skill in the arts would not be able to determine the metes and bounds of this limitation in the claims without engaging in undue experimentation since "accuracy" could measure a number of parameters in a system.

Claim Rejections - 35 USC § 101

14. 35 U.S.C. 101 reads as follows:

Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.

Claims 3-5, 7-9, 11-19, 21-25, 27-29, 31-33, 25 and 37-43 are rejected under 35 U.S.C. 101 because the claimed invention is directed to non-statutory subject matter. The computer system must set forth a practical application of judicial exception to produce a real-world result. Benson, 409 U.S. at 71-72, 175 USPQ at 676-77. The invention is ineligible because it has not been limited to a substantial practical application.

For a claimed invention to be statutory the claimed invention must produce a useful, concrete, and tangible result. As the Supreme Court has made clear, " [a]n idea of itself is not patentable," *Rubber-Tip Pencil Co. v. Howard,* 20 U.S. (1 Wall.) 498, 507 (1874); taking several abstract ideas and manipulating them together adds nothing to the basic equation. In re Warmerdam, 31 USPQ2d 1754 (Fed. Cir. 1994).

For a claimed invention to be statutory under 35 U.S.C. 101, the claims must produce a tangible result, and there must be a practical application, by either: 1) transforming (physical thing) or 2) by having the FINAL RESULT (not the steps) achieve or produce a useful (specific, substantial, AND credible), concrete (substantially repeatable/non-unpredictable), AND tangible (real world/non-abstract) result.

Claim 40 fails to produce a concrete result because the claimed subject matter fails to be limited to the production of an assured, repeatable result. More specifically, the claimed subject matter is not repeatable because the claim recites defining a rule

generalization based on logic of at least a first order. However, there is not description as to what data is used to define this rule generalization (is it using the anomaly data in the training data, or does it use any type of data obtained from anywhere which may not even relate to anomalies to create a rule…). Lacking this description, there is no guarantee that the invention will generate this generalisation rule in the same manner every time and different results may be produced given the same data as inputs (not a repeatable result). Moreover, since the claim has not stated any specific and clear relationship between the rule generalisation, the training data and the background knowledge data, a different specific rule may be generated each time the invention is implemented using the same values for these elements.

Claims 3-9, 11-19 and 41 depend on claim 40 and incorporate the same deficiencies as set forth above and furthermore fail to correct the deficiencies.

Claim 42 recites limitations similar to that of claim 40 and is rejected on the same basis.

Claims 21-23, 25 and 27-29 further limit claim 42 but fail to cure the deficiencies set forth above and are rejected on the same basis.

Claim 43 recites limitations similar to that of claim 40 and is rejected on the same basis.

Claims 31-33, 35 and 37-39 further limit claim 43 but fail to cure the deficiencies set forth above and are rejected on the same basis.

The courts have also held that a claim may not preempt ideas, laws of nature or natural phenomena. The concern over preemption was expressed as early as 1852.

See Le Roy v. Tatham, 55 U.S. (14 How.) 156, 175 (1852) ("A principle, in the abstract, is a fundamental truth; an original cause; a motive; these cannot be patented, as no one can claim in either of them an exclusive right."); Funk Bros. Seed Co. v. Kalo Inoculant Co., 333 U.S. 127, 132, 76 USPQ 280, 282 (1948).

Accordingly, one may not patent every "substantial practical application" of an idea, law of nature or natural phenomena because such a patent "in practical effect would be a patent on the [idea, law of nature or natural phenomena] itself." "Here the "process" claim is so abstract and sweeping as to cover both known and unknown uses of the BCD to pure-binary conversion. The end use may (1) vary from the operation of a train to verification of drivers' licenses to researching the law books for precedents and (2) be performed through any existing machinery or future-devised machinery or without any apparatus." Gottschalk v. Benson, 409 U.S. 63, 71-72, 175 USPQ 673, 676 (1972).

Claim 40 recites a method for detecting anomalies in data. This data has not been restricted to specify any particular type or nature of data; nor does it specify how or from where the data is obtained or what the data represents. As claimed, any type of data would be covered by the claim, including abstractions which have not been excluded. The claimed invention would cover any end use or practical application where anomalies in data are detected.

Claims 42-43 recite limitations similar to that of claim 40 and are rejected on the same basis.

Claim Rejections - 35 USC § 102

15. In light of the amendments made, the rejections under 35 USC 102 have been withdrawn.

Claim Rejections - 35 USC § 103

16. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

17. Claims 3-5, 7-9, 11-19, 21-25, 27-29, 31-33, 25 and 37-43 are rejected under 35 U.S.C. 103(a) as being unpatentable over Agarwal et al. (US Patent #6,782,377, referred to as **Agarwal**).

Claims 3, 21 and 31

Agarwal teaches the positive anomaly examples are associated with fraud **or** software vulnerabilities (**Agarwal**: C1, L15-27).

Claims 4, 22 and 32

Agarwal teaches developing the rule set using Higher-Order logic (**Agarwal**: C1, L49-65; C8, L5-55; C12-13, appendix 1-2).

Claims 5, 23 and 33

Agarwal teaches developing the rule set by: a) forming an alphabet having selector functions allowing properties of the training data set to be extracted, together with **at least one** of the following: additional concepts, background knowledge constant values and logical AND and OR functions (**Agarwal**: C1, L28 to C2, L14; C3, L10-59; C6, L1-56; C7, L28 to C8 L26; C12-13, appendix 1-2), b) forming current rules from combinations of items in the alphabet such that type consistency and variable consistency is preserved (**Agarwal**: abstract; C3, L10-59; C6, L11-56; C13, claim 1; EN: the P-rules and the N-rules), c) evaluating the current rules for adequacy of classification of the training data set in terms of indicating data anomalies in accordance with data flagging (**Agarwal**: abstract; C3, L1-59; C4, L16-67; C5, L23-38; C6, L11 to C7, L27; C8, L27 to C9, L24; C14, claims 6-8), d) if no current rule adequately classifies the training data set, generating new rules by applying **at least one** genetic operator to the current rules, a genetic operator having **one of** the following functions: i) combining two rules to form a new rule, ii) modifying a single rule by deleting one of its conditions or adding a new condition to it, or iii) changing one of a rule's constant values for another of an appropriate type (**Agarwal**: C1, L15 to C2, L14; C3, L10-59; C4, L16-67; C6, L11 to C7, L18; C7, L28 to C9, L24; C12-13, appendix 1-2), and e) designating the new rules as the current rules and iterating steps c) onwards until a current rule adequately classifies the training data set **or** a predetermined number of iterations is reached (**Agarwal**: C1, L15 to C2, L14; C3, L10-59; C4, L16-67; C6, L11 to C7, L18; C7, L28 to C9, L24; C12-13, appendix 1-2; EN: the stopping

criterion).

Claims 6, 24 and 34

Agarwal teaches data samples in the training data set have characters indicating whether or not they are associated with anomalies (**Agarwal**: C1, L28-35; C3, L11-59; C6, L1 to C7, L3; EN: the positive and negative examples in the dataset or labeled data).

Claim 7

Agarwal teaches detecting telecommunications **or** retail fraud from anomalous data (**Agarwal**: C1, L15-27; EN: telecommunication is the transmission of signals over a distance for the purpose of communication).

Claim 8

Agarwal teaches employing inductive logic programming to develop the rule set (**Agarwal**: abstract; C1, L28 to C2, L44; C3, L11-59; C6, L1 to C7, L3; C12-13, appendix 1-2; EN: item 23 applies. Inductive logic programming (ILP) is a subfield of machine learning which uses logic programming as a uniform representation for examples, background knowledge and hypotheses. Schema: *positive examples* + *negative examples* + *background knowledge* => *hypothesis* (see www.wikipedia.com).

Claims 9, 25 and 35

Agarwal teaches the **at least one** anomaly characterisation rule has a form that an anomaly is either detected or not detected by application of the rule according to whether a condition set of **at least one** condition associated with the rule is or is not fulfilled respectively(**Agarwal**: C1, L15-19; C6, L1 to C7, 27; C8, L27 to C9, L64; C15, claim 10; EN: condition not further defined or restricted to any particular structure. As long as any condition is satisfied, this limitation is met).

Claims 11, 27 and 37

Agarwal teaches **a variable** in the **at least one** anomaly characterisation rule which is defined as being in constant mode and is numerical is at least partly evaluated by providing a range of values for the variable, estimating a respective accuracy for each value and selecting for the variable at least one of the values having optimum accuracy among the accuracies of the range of values (**Agarwal**: C4, L16-49; C6, L1 to C9, L24; EN: item 23 applies. Note the accuracy and support values and determining if a refined rule is accepted or if a current rule is best).

Claim 12

Agarwal teaches the range of values is a first range with spacing between values, a single optimum accuracy value is obtained for the variable, the method includes selecting a second range of values in the optimum accuracy value's vicinity, the second range of values having narrow spacing relative to that of the first range and

the method also includes estimating an accuracy for each value in the second range and selecting a value in the second range having optimum accuracy (**Agarwal**: C6, L1 to C9, L24).

Claim 13

Agarwal teaches filtering to remove rule duplicates and rule equivalents, a rule equivalent being a rule having like but differently ordered conditions compared to another rule, or a rule which has conditions which are symmetric compared to those of another rule (**Agarwal**: C1, L49 to C2, L14; C6, L1 to C7, L3).

Claim 14

Agarwal teaches filtering to remove unnecessary `less than or equal to` ("lteq") conditions (**Agarwal**: C1, L49 to C2, L14; C6, L1 to C7, L3; EN: After a rule is learned, the records where its antecedent is true are removed).

Claim 15

Agarwal teaches the unnecessary lteq conditions are associated with **at least one of** ends of intervals, multiple lteq predicates and equality condition and lteq duplication (**Agarwal**: C1, L49 to C2, L14; C6, L1 to C7, L3).

Claim 16

Agarwal teaches implementing an encoding length restriction to avoid overfitting noisy data by rejecting a rule refinement if the refinement encoding cost in number of bits which exceeds a cost of encoding positive examples covered by the refinement (**Agarwal**: C3, L45-59; C7, L29 to C8, L4).

Claims 17, 29 and 39

Agarwal teaches stopping construction of a rule in response to fulfilment of **at least one of** three stopping criteria, such criteria being: a) the number of conditions in any rule in a beam of rules being processed is greater than or equal to a prearranged maximum rule length, b) no negative examples are covered by a most significant rule, which is a rule that: i) is present in a beam currently being or having been processed, ii) is significant, iii) has obtained a highest likelihood ratio statistic value found so far, and iv) has obtained an accuracy value greater than a most general rule accuracy value, and c) no refinements were produced which were eligible to enter the beam currently being processed in a most recent refinement processing step (**Agarwal**: C6, L11 to C7, L18; C7, L28 to C9, L24; C12-13, appendix 1-2).

Claim 18

Agarwal teaches adding the most significant rule to a list of derived rules and removing positive examples covered by the most significant rule from the training data set (**Agarwal**: C1, L49 to C2, L14; C4, L16-67; C6, L1 to C9, L64; Fig. 2).

Claim 19

Agarwal teaches a) selecting rules which have not met rule construction stopping criteria, b) selecting a subset of refinements of the selected rules associated with accuracy estimate scores higher than those of other refinements of the selected rules, and c) iterating a rule refinement, filtering and evaluation procedure to identify any refined rule usable to test data (**Agarwal**: C4, L16-67; C6, L1 to C9, L64; Fig. 2).

Claims 28 and 38

Agarwal teaches **programmed to** filter out at least one of rule duplicates, rule equivalents and unnecessary Iteq conditions (**Agarwal**: C1, L49 to C2, L14; C6, L1 to C7, L3; EN: item 23 applies. After a rule is learned, the records where its antecedent is true are removed).

Claims 40, 42 and 43

Agarwal teaches an automated method of anomaly detection by applying a rule set to test for anomalies in data, the rule set comprising at least one anomaly characterisation rule (**Agarwal**: abstract; C1, L15-65; C3, L10-59; C4, L16-67; C6, L1-50; C8, L5-54; C13, claim 1; Fig. 2; Examiner's Note (EN): item 23 applies. The rarely occurring target class examples are considered anomalies of data), and the method incorporating the steps of:

a) providing a training data set incorporating positive and negative anomaly examples and expressed as digital data flagged to indicate presence and absence of

data anomalies respectively (**Agarwal**: abstract; C1, L15-65; C3, L10-59; C4, L16-67; C6, L1-50; C8, L5-54; C13, claim 1; Fig. 2; EN: item 23 applies. If there are positive and negative examples identified in the training data set, they are "flagged". Also note that the classifier is a computer, system, which operates on digital data),

b) defining a rule generalisation based on logic **of at least** First-Order (**Agarwal**: C1, L49-65; C6, L1-10; C8, L5-55; C12-13, appendix 1-2; EN: note the disjunctive normal form of the rules. In computer systems Boolean operations are used to define relationships between data), and

c) using computer apparatus to execute the steps of:

i) processing the rule generalisation to transform it into a more specific rule generalisation by adding **at least one of** a condition, a variable, a constant, a unification of variables and a function based on the training data set and **relevant** background knowledge consisting of **at least one of** concepts, facts of interest and functions for calculating values of interest (**Agarwal**: C1, L49 to C2, L34; C3, L11-59; C6, L1 to C7, L27; C8, L5 to C9, L24; C12-13, appendix 1-2; EN: item 23 applies. Note the general to specific technique. Also note that conditions are added to the rules. As for the relevant background data, how is it guaranteed that there will always be "relevant" background data? However, note in appendix 2 that rules R1 and R2 are formed from RF by evaluating attribute-type pair A, considered "relevant" background data),

ii) evaluating the more specific rule generalisation by applying it to the training data set to identify anomalies (**Agarwal**: C1, L49 to C2, L34; C3, L1-59; C6, L1 to C7, L27; C8, L5 to C10, L23; C12-13, appendix 1-3; EN: Note the scores computed for the rules), and

iii) incorporating the more specific rule generalisation in the rule set if it classifies anomalies in the training data set adequately in terms of covering at least some of the positive anomaly examples (**Agarwal**: C3, L1-59; C6, L1 to C7, L27; C8, L27 to C10, L23; C12-13, appendix 1-3; EN: note choosing and evaluating rules, in appendix 2, RF is selected from the best rule in RS is added) and

iv) applying the rule set to test data for anomaly detection therein (**Agarwal**: C3, L1-59; C6, L1 to C7, L27; C8, L27 to C10, L23; C12-13; C13, claim 1), and

Agarwal does not teach d) providing an alert or a report to a user regarding anomaly detection in the test data resulting from operation of the method.

However, It would have been obvious to one of ordinary skill in the arts at the time of the applicant's invention to modify the teachings of Agarwal by incorporating providing an alert or a report to a user regarding anomaly detection in the test data resulting from operation of the method for the purpose of making a user aware of any deviant event that occurs in the system so that they can be corrected and prevented (**Agarwal**: C1, L15-27; EN: It is also noted that a recitation with respect to the manner in

which a claimed apparatus is intended to be employed does not differentiate the claimed apparatus from a prior art satisfying the claimed structural limitations).

Claim 41

Agarwal teaches after the step of evaluating the more specific rule generalisation, the computer apparatus is used to iterate the processing and evaluating steps for one or more rules in the more specific rule generalisation which do not classify anomalies in the training data set adequately (**Agarwal**: C3, L1-59; C6, L1 to C7, L27; C8, L27 to C10, L23; C12-13, appendix 1-3; Fig. 2).

Response to Applicant's arguments

18. The Applicant's arguments regarding the rejection under 35 USC 102 have been fully considered but are not persuasive. The Examiner will consider this arguments as applying to the 35 USC 103 rejection in this Office Action.

In reference to Applicant's arguments on pages 17-18:

The Applicant generally argues that Agarwal does not teach limitations in the claim and in particular that Agarwal does not teach First-Order logic or Higher-Order logic.

Examiner's response:

The arguments presented are a general denial of the rejection made with no specific explanation of how the claimed invention is not disclosed by the prior art applied. The claims and only the claims form the metes and bounds of the invention.

Examiner has full latitude to interpret each claim in the broadest reasonable sense. The Examiner has cited particular columns and line numbers (or paragraphs) in the references applied to the claims and has provided explanation to help the applicant understand how the prior art is considered to read on the claim's limitations.

As for First-Order logic and Higher-Order logic, the claim only recites at least First-Order logic, there is nothing on Higher-Order logic. The Applicant argues that the Agarwal reference teaches propositional logic and provides a definition for First-Order logic: "A fundamental notation for representing and reasoning with logical statements. It extends propositional calculus by introducing the quantifiers, and by allowing predicates and functions of any number of variables". The Applicant argues that Agarwal teaches propositional logic conditions because the conditions are over a single variable. As disclosed in Agarwal, the conditions or rules are not over a single variable, but are over multiple variables (**Agarwal**: C1, L49-65; C6, L1-10; C8, L5-55; C12-13, appendix 1-2; EN: see how rule R is being defined, R:A→C, A being a conjunction of conditions formed by different attributes and their values). Rules are defined as different conditions for different variables and functions that must be satisfied. The rules are defined by combining functions using logical statements. Clearly, Agarwal teaches rules defined using **at least** First-Order logic. Moreover, first order logic is widely known and used in the computer arts and would only require routine skill of a person of ordinary skill in the arts to implement the use of known functions on the basis of its suitability for a particular application as a matter of obvious design choice.

In reference to Applicant's arguments:

The Examiner states that Agarwal anticipates developing the rule set using Higher-Order logic, referring to claims 4, 22 and 32: Applicants respectfully traverse this for reasons given above in relation to claim 40, i.e. Agarwal discloses propositional logic, not Higher-Order logic or even First-Order logic. Moreover, as before Claims 4, 22 and 32 are not anticipated by Agarwal because they depend respectively from claims 40, 42 and 43 which are likewise not anticipated.

Examiner's response:

Higher order logic is a predicate that takes one or more other predicates as arguments. In general, a higher-order predicate of order *n* takes one or more $(n-1)^{th}$ order predicates as arguments (see www.wikipedia.com). Agarwal teaches rules being defined using such predicates used as arguments to define the conditions that must be satisfied for the rule (**Agarwal**: C1, L49-65; C6, L1-10; C8, L5-55; C12-13, appendix 1-2). Clearly, Agarwal teaches higher order logic being used in developing the rules. Moreover, high order logic is widely known and used in the computer arts and would only require routine skill of a person of ordinary skill in the arts to implement the use of known functions on the basis of its suitability for a particular application as a matter of obvious design choice.

In reference to Applicant's arguments:

Applicants have deleted "at least one of the following:" from claims 5, 23 and 33, so that paragraph a) of these claims becomes "forming an alphabet having selector

functions allowing properties of the training data set to be extracted, together with additional concepts, background knowledge constant values and logical AND and OR functions". The extracts from Agarwal cited by the Examiner do not mention "alphabet" or "selector functions" or "background knowledge": Agarwal discloses developing rules and models, not an alphabet. If the Examiner does not accept this, Applicants respectfully request the Examiner to specify the expressions in Agarwal which indicate or correspond to "alphabet", "selector functions" and "background knowledge", and the column(s) and individual line(s) (i.e. not column-length blocks) where they occur.

Examiner's response:

The claims and only the claims form the metes and bounds of the invention. The Examiner has full latitude to interpret each claim in the broadest reasonable sense. It is noted that the Applicant merely seems to argue that the prior art does not show the same terminology used in the claim. The prior art does not have to recite the exact terminology as those in the Applicant's claims in order to convey the same meaning. Claims are examined for the functionality of their limitations within the invention, not for the terms contained in them. The Applicant has not provided any proof that any of the limitations argued (alphabet, selector functions, background knowledge) are functionally distinct from the cited portions of the prior art. There is also no description in the claim or in the arguments as to what any of these limitations mean or represent and how the claim language reflects such meaning. The Examiner considers the set of variables, functions conditions that compose a rule to be an alphabet, the different evaluation functions and Boolean operations that must be satisfied in each rule to be selector

functions and background knowledge could be any other data that is added to the rules. It is noted that the claims do not specify from where this background knowledge is obtained, how it is obtained or what this data represents.

In reference to Applicant's arguments:

It is respectfully submitted that Agarwal does not anticipate claim 11, 27 or 37, because two different concepts are being confused. Claims 11, 27 and 37 relate to deriving a value for a variable in a rule by selecting the value giving optimum accuracy. The Agarwal extracts cited by the Examiner relate to accuracy of a rule, not accuracy of a variable which is a component of a rule: (see inter alia Col. 6, line 27 of Agarwal) in one of the Examiner's cited extracts, "..rules that have high support and high accuracy". Claims 11, 27 and 37 are independently novel for at least this reason.

Examiner's response:

The claims and only the claims form the metes and bounds of the invention. The Examiner has full latitude to interpret each claim in the broadest reasonable sense. The claim has not defined what this accuracy represents. The accuracy of the value as to what? Is it the accuracy of the value as to their contribution to the rule? Is it the contribution of each value in determining a particular feature? As such, the Examiner considers that identifying if a rule has a desired accuracy and support values to determine if a rule is best to include a measure of the accuracy of the values that form the rules. Also note that conjuctive conditions are added to the rules and evaluated to

choose the conditions that have a highest value for the evaluation metric (**Agarwal**: C8, L27-54).

In reference to the Applicant's arguments:

Similarly, claim 12 is not anticipated by Agarwal, because Agarwal does not disclose a range of values for a variable in a rule.

Examiner's response:

The claim has not defined this range to any specific set of values. Therefore, the Examiner considers that if the values of the rules are being varied, they are being varied within a range of values (**Agarwal**: C8, L27-54).

In reference to Applicant's arguments:

The Examiner states that Agarwal anticipates claim 13, which relates to filtering to remove rule duplicates and rule equivalents, and cites Agarwal: C. 1, L.49 to C.2, L. 14; C.6, L. 1 to C.7, L.3. These cited extracts provide no disclosure whatsoever regarding removal of rule duplicates and rule equivalents or the like, and consequently the rejection of claim 13 is respectfully traversed.

Examiner's response:

The claims and only the claims form the metes and bounds of the invention. The Examiner has full latitude to interpret each claim in the broadest reasonable sense. As taught by Agarwal, N-rules are learned to remove false positives from the examples included by the P-rules (**Agarwal**: C6, L1-44). Moreover, the claim recites: "…rule

equivalents, a rule equivalent being a rule having like but differently ordered conditions compared to another rule, and any rule which has conditions which are symmetric compared to those of another rule". What does it mean for a rule to be symmetric to another? Is it rules that have the same number of variables in them? Is a rule removed if it has a condition that has the same number of values as another rule?

In reference to Applicant's arguments:

The Examiner also states that Agarwal anticipates claim 14, which relates to filtering to remove unnecessary 'less than or equal to' ("lteq") conditions, and cites Agarwal: C. 1, L.49 to C.2, L. 14; C.6, L. 1 to C.7, L.3. Here again, the cited extracts provide no disclosure whatsoever regarding removing unnecessary lteq conditions or the like, and consequently the objection is respectfully traversed. The Examiner observes that "After a rule is learned, the records where its antecedent is true are removed". However, here claim 14's deletion of redundant rules is being confused with Agarwal's removing (from the training dataset) data for which the rule is true, which is quite different (see e.g.C.6 L.21). Similar remarks apply to claim 15.

Examiner's response:

The argument above does not provide an explanation as to how the language of the limitations in the claim provide for an invention not disclosed in the prior art. The Examiner considers that if examples or records are deleted after a rule is learned, less than **or equal to** (lteq) conditions are removed. Note that there is nothing in the claim as to from where this conditions are removed.

In reference to Applicant's arguments:

The examiner next takes the position that Agarwal anticipates claim 16, which relates to an encoding length restriction to avoid overfilling noisy data by rejecting a rule refinement having too high an encoding cost. The Examiner citing Agarwal C.3, L.45-59; C.7, L.29 to C.8, L.4 for supplying this teaching. Of these extracts, C.7 L.54-57 discloses a stopping criterion of the Description Length of the set of N-Rules not increasing beyond a pre-specified limit. However, this objection arises from Agarwal's length of an entire set of rules being confused with Applicants' length of an individual rule refinement, which might be a rule or part of a rule. Consequently the rejection is respectfully traversed as claim 16 is novel.

Examiner's response:

The claims and only the claims form the metes and bounds of the invention. The Examiner has full latitude to interpret each claim in the broadest reasonable sense. Rule refinement has not been further defined to a particular process in the claim. As such, the Examiner interprets this refinement to mean processing of a rule and the claim to mean that rules will not be processed further (rejecting rule refinements) if an encoding cost has been exceeded.

In reference to Applicant's arguments:

The Examiner further states that Agarwal anticipates claims 17, 29 and 39, which relate to stopping construction of a rule in response to fulfilment of at least one of three Agarwal stopping criteria, a) number of conditions in a rule, b) no negative examples are

covered by a most significant rule, and c) no refinements produced eligible to enter the beam currently processed in a most recent refinement processing step. The examiner cited Agarwal extracts C.6, L.11 to C.7, L.18, C.7, L.28 to C.9, L.24 and. C.12-13, Appendices 1-2 for supplying this teaching. The examiner's rejection is respectfully traversed because Agarwal uses stopping criteria different to those of claims 17, 29 and 39. In this regard Agarwal C.9 L.5-24 discloses accepting R1 or stopping at R for P-Rules according to whether or not R1 's EvaluationMetric is greater than that of R and enough training data examples are covered (MinSupFractionP). For N-Rules a rule grows until a false positive is covered and one less true positive is supported.

Examiner's response:

The claims and only the claims form the metes and bounds of the invention. The claim recites stopping construction of a rule in response to fulfillment of at least one of three stopping criteria. Agarwal teaches at least criteria a) and c) (Agarwal: C6, L11 to C7, L18; C7, L28 to C9, L24; C12-13, appendix 1-2). Note all of the evaluation metrics applied to the rules and the stopping criterions for learning rules.

In reference to Applicant's arguments:

Regarding claim 18, the Examiner states that Agarwal anticipates adding the most significant rule to a list of derived rules and removing positive examples covered by it from the training data set, citing Agarwal C.1, L.49 to C.2, L.14; C.4, L.16-67; C.6, L.I to C.9, L.64; Fig. 2). This rejection is also respectfully traversed, because Agarwal uses different criteria for adding rules to a list of derived rules. In this connection,

Applicants' specification at page 20 lines 18-22 defines a rule as 'significant' if its likelihood ratio statistic value is greater than a predefined threshold. Moreover, claim 18 depends from claim 17, which requires a most significant rule to cover no negative examples. In contradistinction, at C.6 L.23-24, Agarwal discloses P-Rules, i.e. rules added to the list of derived P-Rules. The P-Rules cover positive and negative examples, and at C.6 L.41-44 Agarwal discloses N-Rules used to remove the false positives from the P-Rules. Consequently claim 17 is novel because the list of the P-Rules is specified in Agarwal before removing false positives, not afterwards as in claim 17. Dependent claim 18 is novel for this reason as well.

Examiner's response:

The claims and only the claims form the metes and bounds of the invention. The specification is not the measure of the invention and limitations appearing in the specification but not recited in the claim are not read into the claim. There is also nothing on claim 17 that requires that no negative examples are covered by the most significant rule, since the claim provides for the alternative of the three criteria in the claim (at least one of...). Moreover, there is no argument about how exactly the claim language used in the limitations of claim 18 make the invention distinct from the prior art cited.

In reference to Applicant's arguments:

Finally, the Examiner states that Agarwal anticipates Claim 19, i.e. a) selecting rules which have not met rule construction stopping criteria, b) selecting a subset of

refinements of the selected rules associated with accuracy estimate scores higher than those of other refinements of the selected rules, and c) iterating a rule refinement, filtering and evaluation procedure to identify any refined rule usable to test data. The Examiner cites in particular Agarwal C.4, L. 16- 67; C.6, L.1 to C.9, L.64; Fig. 2). However, it is respectfully submitted that this rejection arises from Agarwal's rule accuracy being confused with Applicants' accuracy of a refinement to a rule, which is quite different. Agarwal does not disclose accuracy of a refinement to a rule - see inter alia C.6 L.27 in one of the Examiner's cited extracts, "..rules that have high support and high accuracy". Claim 19 is independently novel for at least this reason.

Examiner's response:

The claims and only the claims form the metes and bounds of the invention. The claim does not suggest that each rule selected is selected based on an accuracy value. It merely states that the subset of refinements of the selected rules are associated with accuracy estimates. Moreover, as stated above, the Examiner considers refinement to mean a processing of a rule (not an actual rule), since there is no definition in the claim as to what this refinement means.

Examination Considerations

19. Examiner has cited particular columns and line numbers (or paragraphs) in the references applied to the claims above for the convenience of the applicant. Although the specified citations are representative of the teachings of the art and are applied to specific imitations within the individual claim, other passages and figures may apply as

well. It is respectfully requested from the Applicant in preparing responses, to fully consider the references in their entirety as potentially teaching all or part of the claimed invention, as well as the context of the passage as taught by the prior art or disclosed by the Examiner. The entire reference is considered to provide disclosure relating to the claimed invention.

20. The claims and only the claims form the metes and bounds of the invention. "Office personnel are to give the claims their broadest reasonable interpretation in light of the supporting disclosure. In re Morris, 127 F.3d 1048, 105455, 44USPQ2d 1023, 1027-28 (Fed. Cir. 1997). Limitations appearing in the specification but not recited in the claim are not read into the claim. In re Prater, 415 F.2d, 1393, 1404-05, 162 USPQ 541, 550-551 (CCPA 1969)" (MPEP p 2100-8, c 2, l 45-48; p 2100-9, c 1, l 1-4). The Examiner has full latitude to interpret each claim in the broadest reasonable sense. Examiner will reference prior art using terminology familiar to one of ordinary skill in the art. Such an approach is broad in concept and can be either explicit or implicit in meaning.

21. Examiner's Notes are provided with the cited references to prior art to assist the applicant to better understand the nature of the prior art, application of such prior art and, as appropriate, to further indicate other prior art that maybe applied in other office actions. Such comments are entirely consistent with the intent and spirit of compact prosecution. However, and unless otherwise stated, the Examiner's Notes are not prior art but a link to prior art that one of ordinary skill in the art would find inherently appropriate.

22. Unless otherwise annotated, Examiner's statements are to be interpreted in reference to that of one of ordinary skill in the art. Statements made in reference to the condition of the disclosure constitute, on the face of it, the basis and such would be obvious to one of ordinary skill in the art, establishing thereby an inherent prima facie statement.

23. Examiner's Opinion: items 20-22 apply. The claims and only the claims form the metes and bounds of the invention. The Examiner has full latitude to interpret each claim in the broadest reasonable sense.

Conclusion

24. Claims 3-5, 7-9, 11-19, 21-25, 27-29, 31-33, 25 and 37-43 are rejected.

25. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of

the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Correspondence Information

26. Any inquires concerning this communication or earlier communications from the examiner should be directed to Omar F. Fernández Rivas, who may be reached Monday through Friday, between 7:00 a.m. and 4:00 p.m. EST. or via telephone at (571) 272-2589 or email omar.fernandezrivas@uspto.gov.

If you need to send an Official facsimile transmission, please send it to (571) 273-8300.

If attempts to reach the examiner are unsuccessful the Examiner's Supervisor, David Vincent, may be reached at (571) 272-3080.

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Tuesday, January 27, 2009.
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